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UNITED STATES DEPARTMENT OF AGRICULTURE
Weather Bureau
Instrument Division

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SPECIFICATIONS FOR THERMOMETERS, METEOROLOGICAL,
EXPOSED MERCURIAL.
on Corrosion Resisting Steel Backs.

1. Stems- The stems shall be of glass, about $1/4$ inch in diameter (between $7/32$ -inch and $9/32$ -inch.
 2. White strip- To facilitate readings a strip of white glass shall be provided running the full length of the stem back of the bore.
 3. Bulbs- Bulbs must be cylindrical in form, not more than $2/10$ -inch in diameter nor longer than $7/8$ -inch, of clear glass of a quality that will not change appreciably with age.
 4. Neck- In order to make provision for securely tying a muslin to the bulb, a neck of smaller diameter than the bulb below or the stem above must be formed just above the junction of stem with bulb.
 5. Length- Length of stem and bulb combined must be not less than $10-1/4$ nor more than $10-3/4$ inches.
 6. Filling- The thermometers must be filled with pure mercury. The space not occupied by the mercury to be a vacuum.
 7. Terminal nib- As a provision for holding the tube in its proper relation to the back when subsequently mounted, a nib approximately $3/32$ -inch thick will be formed at the upper end of the stem.
 8. Graduations- All lines, figures, and letters to be etched, clear cut and distinct. Graduations shall be to whole degrees Fahrenheit. The first and each succeeding 5 and 10 degree line to be longer than the remaining lines. Graduations to be numbered at each multiple of 10 degrees Fahrenheit, numbers below zero to be preceded by the minus sign. Figures shall be etched to the right of the bore, but in a vertical position when the stem is held horizontally with bulb to the left. The lowest line of graduation must be approximately $3-5/8$ inches below the top of the stem.
- Each tube will bear near the upper end a serial number (indicated in the order). All etchings to be filled with best quality black pigment.
9. Range- The lower limits may range between minus 20° and minus 40° Fahrenheit. The upper limits may range between plus 110° and plus 130° Fahrenheit.

(Exposed Mercurial)

10. Scale error.- The error at any point of the scale must be no greater than the following:

At 32° (ice point)	0.2 degree.
Above 32°	0.3 degree.
Between 32° and 12°	0.3 degree.
Below 12°	0.6 degree.

The change in the error for a distance of 10 degrees must be no greater than 0.3 degree on any part of the scale.

11. Openness of scale.- The distance between points 20° Fahrenheit apart need not be more than 1.3 inches, but must not be less than 1.0 inch.

12. Mounting.- Each thermometer tube must be mounted upon a back consisting of a strip 1/32-inch thick by 29/32 of an inch wide by 9-1/2 inches long, made of corrosion resisting steel conforming to U. S. Navy Specifications 47S20a, dated May 28, 1934, symbol designation CRS1, finish No. 6, Commercial polish, Tampico brushed.

Three holes must be drilled through the back. At the top end of the strip a 1/8 inch hole must be drilled, with its center 1/4 inch from the top margin. On the left hand margin two holes must be drilled, each No. 36 drill, (.106 inch), the center of upper hole to be 5/32-inch from the left side of the strip and 3/8-inch below the top. The center of the lower hole to be 5/32-inch from the left side of the strip and 7-3/8 inches below the top. A corrugation not less than 1/8-inch deep, curved to fit the thermometer tube, must be formed in the back, the corrugation extending lengthwise from the lower end to the position of the terminal nib of the glass stem. At the upper end of the corrugation a suitable hole must be cut through the back to receive the terminal nib described in paragraph 7. Top of thermometer tube shall be about 1/2-inch below top of back.

13. Markings on backs- Graduation lines for each multiple of 5 degrees must be made on the backs opposite and to the right of the corresponding graduations on the stems. Appropriate numbers must be made on the back opposite each multiple of 10 degrees. The serial number of the thermometer and the letters U.S.W.B. will be placed on the left hand margin.

14. Clamps.- The glass tubes must be secured to the backs by corrosion resisting steel straps and No. 0-80 fillister head screws, carefully and well made, and so formed as to properly fit and hold the tubes to the back.

15. Workmanship- First class and thoroughly finished instruments are required. For example, stems must be straight and of uniform bore. Bulbs must be of uniform thickness and joined to the stem in a smooth and workmanlike manner. Metal parts must be free from burrs or rough edges, but not rounded nor beveled to any perceptible degree.

(Exposed Mercurial)

16. Each instrument will be carefully inspected and tested before acceptance; but recognizing the difficulty attending the production of a large number of thermometers that come within the limits prescribed in these specifications, it is stated that while the purchasing bureau or department will in its discretion strictly adhere to said specifications, yet it is not the intention to reject instruments inherently correct and of good workmanship, provided the greater part of the thermometers furnished come within the limits herein prescribed, and prove satisfactory throughout.

17. Prospective bidders will be required to furnish evidence of their ability to produce and deliver in the quantity required thermometers of the character indicated in the above specifications.

18. There must be no change in the ice point measureable by customary methods of testing during a period of 90 days. The right is reserved to delay payment for a period of 90 calendar days for the purpose of making repeat tests to determine shift of the ice point.

B. C. Kadel,
Chief of Instrument Division.

Washington, D. C.
October 20, 1934.

These specifications supersede
specifications for exposed
thermometers dated October 22, 1930.

